Case Study ID

96-0007

ENERGY OFFICE

Case Study Series

Bay de Noc Community College

Light Pipe Project

Description

The Bay de Noc Community College installed fourteen light pipes in its Extension Center Building in July 1996 as part of the Energy Office's light pipe pilot program. This program was funded by the Department of Energy's State Energy Program. The objective was to promote new energy efficient technologies in commercial applications. Light pipes are a lower cost, more efficient means to provide natural daylight to a building. Light pipes take both direct and diffused sunlight and guide it in a reflective tube to a diffuser. Because daylight is free, day lighting systems can significantly reduce lighting costs. Work and learning environments are improved by having natural daylight.

Light Pipe Features

- Light passes through a clear roof-mounted acrylic dome
- Light reflects down the mirrored tubing to a ceiling mounted diffuser
- The sunlight is diffused throughout the entire room area
- One 13" light pipe can illuminate up to 400 square feet of office or residential space
- The tubing fits easily between rafters, no structural changes to the building are required
- Installed price is one-half of a sky light
- Lights evenly without glare
- Maximizes color perception
- Daylight improves working environment; improves employee mood and morale
- Pays for itself through lighting energy savings

Energy Savings

The light pipes were installed after a complete lighting retrofit on the building. The lighting retrofit replaced the existing standard fluorescent fixtures with energy efficient T-8 bulbs and electronic ballasts. Motion sensors were installed at this time as well. The lighting retrofit reduced the total kilowatt hours of the building by 29%. After the light pipe installation, the kilowatt hours were reduced by another 15%.

The kilowatt usage for the base year of 95-96 was 25,091 ($1,559). The following year, after the light pipe installation, this was reduced to 21,290 ($1,326). To achieve optimal savings with the light pipes, day light sensors would be recommended. These sensors would reduce the fluorescent lighting as the daylight increased. The Bay de Noc Extension Center Building relies on manual control to reduce the fluorescent lighting when there is adequate day light.

Employee response to the light pipes has been very positive. One employee commented that she now has fewer headaches.

LIGHTING LEVELS:
Lighting Levels (foot-candles) at desk height

Location	Bright Sun (Lights on)	Bright Sun (Lights off)	Cloudy Sun (Lights on)	Cloudy Sun (Lights off)
lobby	70	60	80	40
Hallway	80	50	80	40
Hallway	80	70	70	35
Hallway	100	55	80	40
Office	70	30	50	20
Office	70	30	50	20
Office	100	70	60	25
Hallway	100	40	50	10
Hallway	80	30	50	10
Hallway	70	60	30	10
Hallway	70	35	35	10
Hallway	50	25	20	10
Hallway	40	25	20	10
Office	100	70	60	35

Recommended Lighting Levels:
Halls and Entrances: 10-15 fc
Offices: 50-70 fc

For more information regarding this particular Energy Project or topic contact:

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Feel free to contact us if you have any ideas for case studies or other questions :

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